* NOTICES *

CLAIMS

[Claim(s)]
[Claim 1]A high saturation magnetic flux density low loss ferrite sintered compact in which saturation magnetic flux density in 100 ** is [a measurement magnetic field] 450 or more mT in 1000 A/m, and a measuring condition is characterized by the minimum of core loss being below 1500 kW/m^3 in 50 kHz and 150mT.
[Claim 2]The high saturation magnetic flux density low loss ferrite sintered compact according to claim 1 in which content of iron oxide is characterized by 0-20-mol % (however, 0 is not included) and the remainder comprising manganese oxide in content of 60-75-mol % and a zinc oxide as the main ingredients.
[Claim 3]The high saturation magnetic flux density low loss ferrite sintered compact according to claim 2 which calcination temperature is not less than 1150 **, and is characterized by calcinating an oxygen density of an attaching part at the time of calcination on 1% or less of conditions.
[Claim 4]In [a rate of change in saturation magnetic flux density in 100 ** / on 1000 A/m and as opposed to saturation magnetic flux density in 20 ** in a measurement magnetic field / is 15% or less, and] 50 kHz and 150mT a measuring condition, A high saturation magnetic flux density low loss ferrite sintered compact, wherein the minimum of core loss is below 1500 kW/m^3.
[Claim 5]The high saturation magnetic flux density low loss ferrite sintered compact according to claim 4 in which content of iron oxide is characterized by 0-20-mol % (however, 0 is not included) and the remainder comprising manganese oxide in content of 60-75-mol % and a zinc oxide as the main ingredients.
[Claim 6]The high saturation magnetic flux density low loss ferrite sintered compact according to claim 5 which calcination temperature is not less than 1150 **, and is characterized by calcinating an oxygen density of an attaching part at the time of calcination on 1% or less of conditions.
[Claim 7]A high saturation magnetic flux density low loss ferrite sintered compact in which saturation magnetic flux density in 100 ** is [a measurement magnetic field] 480 or more mT in 4000 A/m, and a measuring condition is characterized by the minimum of core loss being below 1500 kW/m^3 in 50 kHz and 150mT.
[Claim 8]The high saturation magnetic flux density low loss ferrite sintered compact according to claim 7, wherein content of iron oxide changes in the main ingredients and 0-20-mol % (however, 0 is not included) and the remainder comprise manganese oxide in content of 60-75-mol % and a zinc oxide.
[Claim 9]The high saturation magnetic flux density low loss ferrite sintered compact according to claim 8

which calcination temperature is not less than 1150 **, and is characterized by calcinating an oxygen density of an attaching part at the time of calcination on 1% or less of conditions.
[Claim 10]In [a rate of change in saturation magnetic flux density in 100 ** / on 4000 A/m and as opposed to saturation magnetic flux density in 20 ** in a measurement magnetic field / is 20% or less, and] 50 kHz and 150mT a measuring condition, A high saturation magnetic flux density low loss ferrite sintered compact, wherein the minimum of core loss is below 1500 kW/m^3.
[Claim 11]The high saturation magnetic flux density low loss ferrite sintered compact according to claim 10 in which content of iron oxide is characterized by 0-20-mol % (however, 0 is not included) and the remainder comprising manganese oxide in content of 60-75-mol % and a zinc oxide as the main ingredients.
[Claim 12]The high saturation magnetic flux density low loss ferrite sintered compact according to claim 11 which calcination temperature is not less than 1150 **, and is characterized by calcinating an oxygen density of an attaching part at the time of calcination on 1% or less of conditions.
[Claim 13]A high saturation magnetic flux density low loss ferrite sintered compact in which saturation magnetic flux density in 100 ** is [a measurement magnetic field] 450 or more mT in 1000 A/m, and a measuring condition is characterized by the minimum of core loss being below 6000 kW/m^3 in 100 kHz and 200mT.
[Claim 14]The high saturation magnetic flux density low loss ferrite sintered compact according to claim 13 in which content of iron oxide is characterized by 0-20-mol % (however, 0 is not included) and the remainder comprising manganese oxide in content of 60-75-mol % and a zinc oxide as the main ingredients.
[Claim 15]The high saturation magnetic flux density low loss ferrite sintered compact according to claim 14 which calcination temperature is not less than 1150 **, and is characterized by calcinating an oxygen density of an attaching part at the time of calcination on 1% or less of conditions.
[Claim 16]In [a rate of change in saturation magnetic flux density in 100 ** / on 1000 A/m and as opposed to saturation magnetic flux density in 20 ** in a measurement magnetic field / is 15% or less, and] 100 kHz and 200mT a measuring condition, A high saturation magnetic flux density low loss ferrite sintered compact, wherein the minimum of core loss is below 6000 kW/m^3.
[Claim 17]The high saturation magnetic flux density low loss ferrite sintered compact according to claim 16 in which content of iron oxide is characterized by 0-20-mol % (however, 0 is not included) and the remainder comprising manganese oxide in content of 60-75-mol % and a zinc oxide as the main ingredients.
[Claim 18]The high saturation magnetic flux density low loss ferrite sintered compact according to claim 17 which calcination temperature is not less than 1150 **, and is characterized by calcinating an oxygen density of an attaching part at the time of calcination on 1% or less of conditions.
[Claim 19]A high saturation magnetic flux density low loss ferrite sintered compact in which saturation magnetic flux density in 100 ** is [a measurement magnetic field] 480 or more mT in 4000 A/m, and a measuring condition is characterized by the minimum of core loss being below 6000 kW/m^3 in 100 kHz and 200mT.
[Claim 20]The high saturation magnetic flux density low loss ferrite sintered compact according to claim 19 in which content of iron oxide is characterized by 0-20-mol % (however, 0 is not included) and the remainder comprising manganese oxide in content of 60-75-mol % and a zinc oxide as the main ingredients.
[Claim 21]The high saturation magnetic flux density low loss ferrite sintered compact according to claim 20

which calcination temperature is not less than 1150 **, and is characterized by calcinating an oxygen density of an attaching part at the time of calcination on 1% or less of conditions.

[Claim 22]In [a rate of change in saturation magnetic flux density in 100 ** / on 4000 A/m and as opposed to saturation magnetic flux density in 20 ** in a measurement magnetic field / is 20% or less, and] 100 kHz and 200mT a measuring condition, A high saturation magnetic flux density low loss ferrite sintered compact, wherein the minimum of core loss is below 6000 kW/m^3.

[Claim 23]A claim 22 written quantity saturation magnetic flux density low loss ferrite sintered compact in which content of iron oxide is characterized by 0-20-mol % (however, 0 is not included) and the remainder comprising manganese oxide in content of 60-75-mol % and a zinc oxide as the main ingredients.

[Claim 24]The high saturation magnetic flux density low loss ferrite sintered compact according to claim 23 which calcination temperature is not less than 1150 **, and is characterized by calcinating an oxygen density of an attaching part at the time of calcination on 1% or less of conditions.

[Claim 25]A choke coil producing using one high saturation magnetic flux density low loss ferrite sintered compact of claims 1-24.

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* NOTICES *

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[The technical field to which an invention belongs] This invention relates to the choke coil using the ferrite sintered compact and this which have [high saturation magnetic flux density and low-loss] at about 100 ** high temperature.
[0002]
[Description of the Prior Art]In recent years, as for various electronic equipment, by the minuteness making, high integration, and high-frequency-izing of LSI, it multi-functionalizes and the small weight saving is accelerated further. Thus, while high power is required also of the power source line which supplies electric power when the degree of location of several kinds of parts goes up and improvement in the speed and highly efficient-ization progress, the demand of efficient-izing of a circuit is also still higher.
[0003]For example, if a notebook sized personal computer is mentioned as an example, since the degree of location of parts going up and generation of heat from CPU will become large, control of the heat around a circuit has been an important technical problem.
[0004]As a multifunctional and high-definition flow, high current-ization of the DC to DC converter which supplies electric power progresses by improvement in the speed of CPU, i.e., the improvement in throughput, large-scale-izing, high-speed-izing of memory storage, etc., and there is also a problem that the efficiency of a circuit worsens. That is, it can be said that maintaining predetermined performance also in an elevated temperature and an efficient thing are important for the DC to DC converter of the notebook sized personal computer using highly efficient CPU.
[0005]
[Problem(s) to be Solved by the Invention]In order to maintain predetermined performance also at the choke coil used for DC to DC converters, such as a notebook sized personal computer, in an elevated temperature and to suppress generation of heat for the above-mentioned reason, the small thing of the loss is demanded.
[0006]As a magnetic material used for the core of these choke coils, there are two kinds, a metal system magnetic material and a ferrite, and a ferrite is further divided into nickel system and Mn system. There is a problem referred to as its saturation magnetic flux density being high compared with a ferrite, its price being generally high [even if a metal system magnetic material sends big current for this reason, it has the merit of being hard to carry out magnetic saturation, but], and being unable to use it if it becomes high frequency.

About this point and a ferrite, high frequency also has the merit that a price is also cheap, usable. Since the direction of Mn system ferrite generally has especially high saturation magnetic flux density in a ferrite compared with nickel system ferrite and the loss is small, it is suitable for the choke coil.

[0007]However, in the conventional Mn system ferrite, although the saturation magnetic flux density of about 20 ** was high, when it became an elevated temperature, saturation magnetic flux density became low, and the saturation magnetic flux density in 100 ** was usually falling about 20 to 25% compared with the saturation magnetic flux density in 20 **. For this reason, when the ferrite of a Mn system was used for transformers, such as a DC to DC converter, and the temperature of the ferrite core rose by generation of heat of CPU etc., there was a problem that saturation magnetic flux density will fall.

[0008]In view of the above, at about 100 ** high temperature, this invention has high saturation magnetic flux density, and an object of this invention is to provide the ERAITO sintered compact which is moreover low-loss, and to provide the choke coil using this.

[0009]

[Means for Solving the Problem]In 1000 A/m, saturation magnetic flux density in 100 ** is 450 or more mT, and measurement magnetic field of this invention is a high saturation magnetic flux density low loss ferrite sintered compact in which a measuring condition is characterized by the minimum of core loss being below 1500 kW/m^3 in 50 kHz and 150mT.

[0010]A rate of change in saturation magnetic flux density in 100 ** [on 1000 A/m and as opposed to / this invention / saturation magnetic flux density in 20 ** in a measurement magnetic field] is 15% or less, And a measuring condition is a high saturation magnetic flux density low loss ferrite sintered compact characterized by the minimum of core loss being below 1500 kW/m^3 in 50 kHz and 150mT.

[0011]A measurement magnetic field is [saturation magnetic flux density of this invention in 100 **] 480 or more mT in 4000 A/m, And a measuring condition is a high saturation magnetic flux density low loss ferrite sintered compact characterized by the minimum of core loss being below 1500 kW/m^3 in 50 kHz and 150mT.

[0012]A rate of change in saturation magnetic flux density in 100 ** [on 4000 A/m and as opposed to / this invention / saturation magnetic flux density in 20 ** in a measurement magnetic field] is 20% or less, And a measuring condition is a high saturation magnetic flux density low loss ferrite sintered compact characterized by the minimum of core loss being below 1500 kW/m^3 in 50 kHz and 150mT.

[0013]A measurement magnetic field is [saturation magnetic flux density of this invention in 100 **] 450 or more mT in 1000 A/m, And a measuring condition is a high saturation magnetic flux density low loss ferrite sintered compact characterized by the minimum of core loss being below 6000 kW/m^3 in 100 kHz and 200mT.

[0014]A rate of change in saturation magnetic flux density in 100 ** [on 1000 A/m and as opposed to / this invention / saturation magnetic flux density in 20 ** in a measurement magnetic field] is 15% or less, And a measuring condition is a high saturation magnetic flux density low loss ferrite sintered compact characterized by the minimum of core loss being below 6000 kW/m^3 in 100 kHz and 200mT.

[0015]A measurement magnetic field is [saturation magnetic flux density of this invention in 100 **] 480 or more mT in 4000 A/m, And a measuring condition is a high saturation magnetic flux density low loss ferrite

sintered compact characterized by the minimum of core loss being below 6000 kW/m^3 in 100 kHz and 200mT.

[0016]A rate of change in saturation magnetic flux density in 100 ** [on 4000 A/m and as opposed to / this invention / saturation magnetic flux density in 20 ** in a measurement magnetic field] is 20% or less, And a measuring condition is a high saturation magnetic flux density low loss ferrite sintered compact characterized by the minimum of core loss being below 6000 kW/m^3 in 100 kHz and 200mT.

[0017]As for a high temperature quantity saturation magnetic flux density ferrite sintered compact of this invention, it is preferred that content of iron oxide is a MnZn system ferrite sintered compact in which 0-20-mol % (however, 0 is not included) and the remainder comprise manganese oxide in content of 60-75-mol % and a zinc oxide as the main ingredients.

[0018]Calcination temperature is not less than 1150 **, and, as for a MnZn system ferrite sintered compact of this invention, it is preferred that an oxygen density of an attaching part at the time of calcination is calcinated in 1% or less of firing condition. If temporary calcination is performed in nitrogen, saturation magnetic flux density will improve further. For this reason, it is preferred to perform temporary calcination in nitrogen.

[0019]This invention can obtain a choke coil which has desired performance in an elevated temperature by producing a choke coil using a ferrite sintered compact which has the above-mentioned feature.

[0020]

[Embodiment of the Invention]In the conventional Mn system ferrite, it has high saturation magnetic flux density, and there are some in which the saturation magnetic flux density at 20 ** exceeds 500mT. However, when it came to 100 **, saturation magnetic flux density decreased to about 400 mT, and there was nothing that has high saturation magnetic flux density at 100 **. Even if it saw the rate of change with a saturation magnetic flux density of 20 ** and 100 **, it was few and had deteriorated about 20%.

[0021]This invention is high saturation magnetic flux density in high temperature, and tried various examination of selection of principal component composition, control of a temporary firing environments, and control of a firing condition for the purpose of obtaining a low-loss ferrite sintered compact. As a result, it is high saturation magnetic flux density in high temperature, and found out that a low-loss ferrite sintered compact could be obtained.

[0022]That is, the ferrite sintered compact of this invention is characterized by the thing which are shown below and for which it has one of the elevated-temperature quantity saturation magnetic flux density characteristics at least.

(1) A measurement magnetic field is [the saturation magnetic flux density in 100 **] 450 or more mT in 1000 A/m. Preferably, 470 or more mT is 500 or more mT still more preferably.

(2) The rate of change in the saturation magnetic flux density in 100 ** [on 1000 A/m and as opposed to the saturation magnetic flux density in 20 ** in a measurement magnetic field] is 15% or less. Preferably, it is 5% or less still more preferably 10% or less.

(3) A measurement magnetic field is [the saturation magnetic flux density in 100 **] 480 or more mT in 4000 A/m. Preferably, 500 or more mT is 520 or more mT still more preferably.

(4) The rate of change in the saturation magnetic flux density in 100 ** [on 4000 A/m and as opposed to the saturation magnetic flux density in 20 ** in a measurement magnetic field] is 20% or less. Preferably, it is

10% or less still more preferably 15% or less.

[0023]Furthermore, the ferrite sintered compact of this invention is characterized by the following things it has in accordance with one of the low-loss characteristics at least, with the above-mentioned elevated-temperature quantity saturation magnetic flux density characteristic having.

(1) A measuring condition is [the minimum of core loss] below 1500kW[/m] ^{3} in 50 kHz and 150mT. Preferably, it is below 1000kW[/m] ^{3}, and is below 500 kW/m^3 still more preferably.

(2) A measuring condition is [the minimum of core loss] below 6000kW[/m] ^{3} in 100 kHz and 200mT. Preferably, it is below 4000kW[/m] ^{3}, and is below 3000 kW/m^3 still more preferably.

[0024]Since the magnetic flux density of a ferrite core reaches and will not change to saturation if a measurement magnetic field sends big current in 1000 A/m or 4000 A/m when the saturation magnetic flux density in 100 ** is less than 450 mT or less than 480 mT, it becomes impossible to achieve the function as a choke coil. For this reason, a high current cannot be sent.

[0025]When the rate of change in the saturation magnetic flux density in 100 ** [on 1000 A/m or 4000 A/m and as opposed to the saturation magnetic flux density in 20 ** in a measurement magnetic field] is not less than 20%, a high current cannot be sent for the above-mentioned reason.

[0026]When the minimum of core loss exceeds 1500 kW/m^3 or 6000 kW/m^3 in 50 kHz, 150mT or 100 kHz, and 200mT in a measuring condition, the temperature of a choke coil rises and the predetermined characteristic is no longer obtained.

[0027]As principal component composition of the ferrite of this invention, it is preferred that the content of 60-75-mol % and a zinc oxide is % (however, 0 is not included), and the content of iron oxide is [the 0-20 mol remainder] manganese oxide.

[0028]Saturation magnetic flux density [in / that the content of iron oxide is less than / 60mol% / an elevated temperature] will fall, and the rate of change in saturation magnetic flux density will become large. The temperature which shows the minimum of core loss will be 20 ** or less, and when the temperature of a core exceeds 20 **, there is a risk of starting thermal run-away. If the content of iron oxide exceeds 75-mol%, sintered density will become low, amplitude permeability and saturation magnetic flux density will become low as a result, and core loss will also increase. Therefore, 60-75-mol% of the content of iron oxide is good. Preferably, it is 65-75-mol%.

[0029]Even if the content of a zinc oxide exceeds 20-mol%, the rate of change in saturation magnetic flux density will become large. Therefore, 0-20-mol% (however, 0 is not included) of the content of a zinc oxide is good.

[0030]As a manufacturing method of the ferrite of this invention, calcination temperature is not less than 1150 **, and it is desirable for the oxygen density of the attaching part at the time of calcination to calcinate on 1% or less of conditions. If temporary calcination is performed in nitrogen, saturation magnetic flux density will improve further. For this reason, it is preferred to perform temporary calcination in nitrogen.

[0031]Sintered density becomes it low that calcination temperature is less than 1150 **, amplitude permeability and saturation magnetic flux density become low as a result, and core loss also increases. Even if the oxygen density of the attaching part at the time of calcination exceeds 1%, sintered density becomes low, amplitude permeability and saturation magnetic flux density become low as a result, and core loss also increases.

[0032]If temporary calcination is performed in nitrogen, composition distribution will be equalized compared with the case where it carries out in the air, and the characteristic will improve.
[0033]a part of main ingredients -- Li, Mg, Ti, Co, nickel, Cu, and Sn -- respectively -- less than 5mol% -- it may replace. moreover -- as an additive -- the oxides of aluminum, Si, K, Ca, V, Y, Zr, Nb, Mo, Te, Hf, Ta, W, and Bi, or these compounds -- respectively -- less than 0.2wt% -- you may also contain.
[0034]The example concerning this invention is described in detail below.
example 1 iron oxide, a zinc oxide, and trimanganese tetroxide -- the each specified quantity -- weighing was carried out, and water and a dispersing agent were added to this, it mixed in the medium stirrer mill, and temporary calcination was carried out at 910 ** after desiccation and among nitrogen for 1.5 hours. As an additive, $CaCO_3$700ppm, $SiO_2$60ppm, $Nb_2O_5$250ppm, and $Ta_2O_5$50ppm were added to this, water and a dispersing agent were further added to it, mixing and grinding were performed in the medium stirrer mill, and the slurry was produced. Thus, to the produced slurry, the specified quantity, in addition after agitating and drying, the core of ring shape was produced for the binder by dry-type press forming. The rate of change in the saturation magnetic flux density of the sintered density of the ferrite sintered compact obtained by calcinating this at 1% of an oxygen density and 1300 ** for 5 hours, initial permeability, 20 **, and 100 ** and saturation magnetic flux density and core loss were measured. The rate of change in saturation magnetic flux density was calculated by the formula ((the saturation magnetic flux density of 20 ** - the saturation magnetic flux density of 100 **) / 20 **) of saturation magnetic flux density x100 [%]. A result is shown in Table 1.
[0035]
[Table 1]

No.	組成[mol%]			焼結密度	初透磁率	飽和磁束密度[mT]						コアロス[kW/m³]		備考
	Fe_2O_3	ZnO	MnO	[kg/m³]	at 10kHz	at 1000[A/m]			at 4000[A/m]			50kHz	100kHz	
						20℃	100℃	変化率	20℃	100℃	変化率	150mT	200mT	
1	80	15	5	4780	50	455	455	0	555	505	19.8	2605(140℃)	8760(140℃)	比較例
2	80	10	10	4760	55	475	470	1.1	580	522	19.2	2137(140℃)	7205(140℃)	〃
3	80	5	15	4740	50	465	450	3.2	567	500	11.8	2362(140℃)	7787(140℃)	〃
4	70	15	15	4820	220	504	470	6.7	615	520	15.4	919(140℃)	3207(140℃)	本発明
5	70	10	20	4780	250	486	468	3.7	593	519	12.5	677(140℃)	2618(140℃)	〃
6	70	5	25	4750	300	478	463	3.1	583	514	11.8	805(80℃)	2938(80℃)	〃
7	60	15	25	4910	1300	534	456	14.6	620	506	18.4	326(20℃)	1431(20℃)	〃
8	60	10	30	4900	780	545	466	14.5	620	517	16.6	461(20℃)	1610(20℃)	〃
9	60	5	35	4950	490	550	470	14.5	620	521	16	727(20℃)	2684(20℃)	〃
10	55	10	35	4850	3000	540	430	20.4	620	477	23.1	98(0℃)	500(0℃)	比較例
11	60	25	15	4950	2200	500	410	18	610	455	25.4	171(-20℃)	950(-20℃)	〃

[0036]As Table 1 shows, the example of this invention is understood that the saturation magnetic flux density at 100 ** is high, and the rate of change in saturation magnetic flux density is also small. And the value of core loss is also small and it turns out that it is low-loss.
[0037]On the other hand, if the content of iron oxide will be less than [60mol%], the saturation magnetic flux density at 100 ** will fall. And the rate of change in saturation magnetic flux density will also exceed 20%. When the content of iron oxide becomes more than 80mol%, it turns out that initial permeability and saturation magnetic flux density fall, and core loss also increases. Even if the content of a zinc oxide exceeds 20-mol%, the saturation magnetic flux density at 100 ** falls. In 4000 A/m, the rate of change in saturation magnetic flux density will exceed 20%.
[0038]example diacid-ized iron -- 70-mol % and a zinc oxide -- 10-mol % and trimanganese tetroxide -- 20-mol% -- weighing was carried out, and water and a dispersing agent were added to this, it mixed in the medium stirrer mill, and temporary calcination was carried out at 910 ** by a predetermined atmosphere after desiccation for 1.5 hours. As an additive, $CaCO_3$700ppm, $SiO_2$100ppm, and $Ta_2O_5$300ppm were

added to this, water and a dispersing agent were further added to it, mixing and grinding were performed in the medium stirrer mill, and the slurry was produced. Thus, to the produced slurry, the specified quantity, in addition after agitating and drying, the core of ring shape was produced for the binder by dry-type press forming. The rate of change in the saturation magnetic flux density of the sintered density of the ferrite sintered compact obtained by calcinating this at a predetermined oxygen density and temperature for 5 hours, initial permeability, 20 **, and 100 ** and saturation magnetic flux density and core loss were measured. The rate of change in saturation magnetic flux density was calculated by the formula ((the saturation magnetic flux density of 20 ** - the saturation magnetic flux density of 100 **) / 20 **) of saturation magnetic flux density x100 [%]. A result is shown in Table 2.

[0039]

[Table 2]

No.	仮焼成	本焼成		焼結密度	初透磁率	飽和磁束密度[mT]						コアロス[kW/m³]		備考
	PO_2	PO_2	温度	[kg/m³]	at 10kHz	at 1000[A/m]			at 4000[A/m]			50kHz	100kHz	
	[%]	[%]	[℃]			20℃	100℃	変化率	20℃	100℃	変化率	150mT	200mT	
1	窒素中	0.01	1300	4820	350	512	502	2	611	538	11.9	474(100℃)	2700(100℃)	本発明
2	〃	0.1	〃	4870	470	500	480	4	600	525	12.5	660(100℃)	2710(100℃)	〃
3	〃	1	〃	4780	250	486	468	3.7	593	519	12.5	677(140℃)	2618(140℃)	〃
4	〃	10	〃	4710	200	456	438	3.9	561	490	12.7	1450(140℃)	5330(140℃)	比較例
5	〃	窒素中	1350	4860	280	470	470	0	572	511	10.7	1142(120℃)	5874(100℃)	本発明
6	〃	〃	1300	4830	360	510	500	2	610	535	12.3	589(120℃)	3119(120℃)	〃
7	〃	〃	1250	4870	490	525	503	4.2	625	540	13.6	437(120℃)	1646(100℃)	〃
8	〃	〃	1200	4670	300	505	483	4.4	603	529	12.3	624(120℃)	4211(120℃)	〃
9	〃	〃	1150	4760	340	488	460	5.7	590	520	11.9	847(100℃)	3470(100℃)	〃
10	〃	〃	1100	4700	260	405	390	3.7	513	440	14.2	970(100℃)	4990(100℃)	比較例
11	空気中	〃	1350	4620	270	458	455	0.7	567	503	11.3	886(140℃)	4410(120℃)	本発明
12	〃	〃	1300	4810	380	498	485	2.6	598	526	12	509(120℃)	4790(120℃)	〃
13	〃	〃	1250	4730	540	505	475	5.9	600	524	12.7	455(120℃)	1920(100℃)	〃
14	〃	〃	1200	4730	260	465	450	3.2	572	508	11.2	660(120℃)	4350(100℃)	〃

[0040]As shown in Table 2, the example of this invention is understood that the saturation magnetic flux density at 100 ** is high, and core loss is small.

[0041]On the other hand, if the oxygen density of the attaching part at the time of calcination will exceed 1% or calcination temperature will be less than 1150 **, the saturation magnetic flux density at 100 ** will fall, and core loss will also increase.

[0042]When temporary calcination is performed in nitrogen, it turns out that sintered density improves compared with the case where it carries out in the air, and the saturation magnetic flux density at 20 ** and 100 ** improves as a result.

[0043]In example 3 Example 2, using the raw material of No.6 of Table 2, the choke coil was produced and the DC superimposed characteristic was measured. As a comparative example, the choke coil was produced using the ferrite sintered compact of the shape of isomorphism which has 55-mol % and a zinc oxide for iron oxide, and has 35-mol% (MnO conversion) of presentation for 10-mol % and trimanganese tetroxide, and the DC superimposed characteristic was measured. A result is shown in drawing 1. In the DC superimposed characteristic at 100 **, drawing 1 shows the rate of change of L.

[0044]The example of this invention has a good DC superimposed characteristic compared with the comparative example which is a conventional material, and it turns out that big current can be sent so that drawing 1 may show. It turns out that the example of this invention can demonstrate the characteristic which also had little degradation of a hot DC superimposed characteristic, and was stabilized to generation of heat compared with the comparative example which is a conventional material.

[0045]The ferrite sintered compact and choke coil concerning this invention as above-mentioned, A rate of change with a saturation magnetic flux density [to the saturation magnetic flux density which the saturation magnetic flux density at 100 ** is high, and is 20 **] of 100 ** compared with the conventional ferrite sintered

compact Since [small and] a loss is also small, The stable characteristic can be demonstrated to the problem of generation of heat in high integration and high-current-izing of electronic equipment, and they are very effective electronic parts to the miniaturization of electronic equipment.

[0046]

[Effect of the Invention]According to this invention, the small ferrite sintered compact of a loss can be obtained small [the saturation magnetic flux density at 100 ** is high, and / a rate of change with a saturation magnetic flux density / to the saturation magnetic flux density which is 20 ** / of 100 **]. In the choke coil used for DC to DC converters, such as a notebook sized personal computer, by this, Since [which can control degradation of the characteristics such as saturation magnetic flux density at the time of the elevated temperature of a ferrite core, / that moreover the saturation magnetic flux density at the time of an elevated temperature is high and] the loss is small, The stable characteristic can be demonstrated to the problem of generation of heat in high integration and high-current-izing of electronic equipment, and it is dramatically useful to the miniaturization of electronic equipment.

[Translation done.]